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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/912,589

07/24/2001

David P. Bour

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06/22/2004

PATENT LAW GROUP LLP
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EXAMINER

LOUIE, WAI SING

ART UNIT

PAPER NUMBER

2814

DATE MAILED: 06/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/912,589

Applicant(s)

BOUR ET AL.

Examiner

Wai-Sing Louie

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 May 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 9-13, 15-17, 25-29 and 31-33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 9-13, 15-17, 25-29 and 31-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 9-13, 15-17, 25-29, and 31-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jewell et al. (US 5,960,018) in view of Goetz et al. (US 6,630,692)

With regard to claims 9, 17, and 25, Jewell et al. disclose a method of forming a semiconductor laser device (col. 12, line 21 to col. 39, line 18 and fig. 10) comprising:

- Forming a first semiconductor layer 130 of a first conductivity type and having a first surface (fig. 10);
- Forming a third semiconductor layer 132 of a second conductivity type over the active region 110 (fig. 10);
- Forming an active region 110 directly over the first semiconductor layer 130, the active region 110 including a plurality of quantum well layers. The quantum well layers 54 and 70 are separated by confining (barrier) layer 126, where one of the quantum well layer and the mole fraction of indium of the barrier layer is graded (col. 23, line 55 to col. 24, line 12, col. 25, lines 50-66, and fig. 5), formed from a III-nitride semiconductor alloy (col. 26, lines 55-65) having a composition graded

in a direction substantially perpendicular to the first surface of the first semiconductor layer 130 (fig. 5).

- Jewell et al. disclose the III-nitride semiconductor alloy is $\text{In}_x\text{Ga}_{1-x}\text{As}_y\text{N}_{1-y}$ (col. 26, line 67). However, Goetz et al. disclose the III-nitride semiconductor compound includes InGaN, AlGaN, AlInGaN, AlInGaAsN, AlInGaNP, or combinations (Goetz col. 8, lines 21-23). Goetz et al. teach the different Group III-nitride compound semiconductors emit high brightness light from ultraviolet to green (Goetz col. 1, lines 10-19). Therefore, it would have been obvious for the one with ordinary skill in the art to modify Jewell's device with the teaching of Goetz et al. to include AlInGaN in order to have high brightness device emitting different wavelengths.

With regard to claims 10 and 26, Jewell et al. disclose the semiconductor layers are made of III-nitride alloy, but do not disclose the graded layer has a wurtzite structure. However, it is well known in the art that an III-nitride alloy have a wurtzite crystal structure such as disclose in Goetz et al. (Goetz col. 6, lines 47-48). Therefore, the semiconductor graded layers in Jewell's device has a wurtzite structure.

With regard to claims 11 and 27, Jewell et al. disclose the grading the composition of the III-nitride semiconductor alloy in the graded layer asymmetrically (fig. 5b-5f).

With regard to claims 12 and 28, Jewell et al. disclose grading the composition of the III-nitride semiconductor alloy in the graded layer would reduce the effect of a piezoelectric field in the active region 110 (col. 31, lines 6-27).

With regard to claims 13 and 29, Jewell et al. disclose grading the composition of the III-nitride semiconductor alloy in the graded layer would be graded linearly and would be appeared smoothly on the grading curve (col. 24, lines 8-12 and fig. 5f).

With regard to claims 15-16 and 31-32, Jewell et al. disclose grading the strained quantum well in order to obtain thickness exceeding the critical thickness for the layer (col. 6, lines 15-60). Jewell et al. disclose the grading in the graded layer includes the mole fraction of indium to control the strain of the quantum well (col. 25, lines 50-66). Jewell et al. do not disclose grading the mole fraction of the aluminum. However, Jewell et al., modified by Goetz et al. in claim 14 above, would disclose the semiconductor compound AlInGa_N used in the quantum well. Therefore, it would have been obvious the mole fraction could also be graded to control the strain in the quantum well layer.

With regard to claim 33, Jewell et al. disclose the change in the first element, indium, is from 100% to 50% or 50% changes in composition having a change from 26 Å to 81 Å or 55 Å changes in thickness (curve 32 in fig. 1), which is about 1% per angstrom across a thickness of the graded layer.

Response to Arguments

Applicant's arguments filed 5/24/04 have been fully considered:

- The response has overcome the 35 U.S.C. §112, first paragraph rejection of the previous office action and the 35 U.S.C. §112, first paragraph rejection is withdrawn.

- Applicant's arguments with respect to claims 9-17 and 25-32 have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wai-Sing Louie whose telephone number is (571) 272-1709. The examiner can normally be reached on 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Wsl
June 8, 2004.

LONG PHAM
PRIMARY EXAMINER